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TECHNOLOGY DEPT.

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THE WEEKLY SUMMARY OF CURRENT SCIENCE • NOVEMBER 4, 1944



Sea-Pens

See Page 290

A SCIENCE SERVICE PUBLICATION

OCEANOGRAPHY-PHOTOGRAPHY

Underwater Camera

Pictures are taken automatically by means of a trigger which sets off a flashlight when it touches the ocean floor; without a photographer, animal life is not disturbed.

See Front Cover

► A NEW UNDERWATER camera that will help science uncover secrets of the ocean's floor was revealed by Prof. Maurice Ewing of Columbia University, and a member of the Woods Hole Oceanographic Institute, at a meeting of the Optical Society of America, held in New York.

The camera is its own photographer. A special trigger hangs down from the bottom of the camera. When the tip of the trigger touches the ocean floor, it sets off the flashlights and clicks the shutter. The tip of the trigger may be extended to any practical length, and the lens adjusted so that the picture taken will be in focus, Dr. Ewing reported.

The main advantage of the new camera, Dr. Ewing stated, is that it can be lowered into a submarine world, 100 fathoms or more down, and take its pictures with less disturbance to animal life, and at a lower cost, than by other means. The camera located the sea-pens shown in the center foreground on the front cover of this SCIENCE News LETTER, in waters where they were not previously known.

Two types of camera have been developed, he declared. One has a ballast and a float. The complete unit is tossed over the side of a ship. The ballast carries it to the bottom. When it gets there, a trigger starts clockwork for taking a series of pictures at any pre-set time interval. When the last picture has been made, the camera releases the ballast, and the float carries it back to the surface. A compass and a drift indicator may be suspended in the field of view of the camera to show changes that occur in the direction of the current while the series of pictures is being made. The other type of camera is lowered on a wire, and makes just one picture.

There are many ways in which scientists may be expected to use the new camera, Dr. Ewing reported. Already it has been used to study the habits of deep-sea life in an undisturbed state. In very deep water it has proved valuable for taking a census of the animal population. The camera is better than a collecting net for this purpose, since many

fish escape the net, or are so fragile that they are destroyed by the net before reaching the surface.

Geologists use the camera to study the ocean floor. The camera revealed sand ripples at 97 fathoms, proving that there is enough current at this depth to move sand around. A series of pictures showed that the direction of the ripples changes with tides, proving constant movement. The camera is expected to help uncover many interesting facts about the submarine canyons off the Pacific coast of the United States, Dr. Ewing pointed out.

The first underwater photographs were made 54 years ago in 1890 by a Frenchman named Boutan. The camera he used consisted of a sealed unit for the camera, and a shutter control that extended to the surface. The camera was lowered into shallow water, and the shutter was clicked by means of pulling on the shutter cable. For the next 40 years divers took their cameras down with them, encased in rubber jackets. Dr. William Beebe took pictures through the thick window of his bathysphere. Dr. Williamson took pictures from the window of a gondola dropped beneath the surface, with a flexible tube large enough to permit a man to pass through it, extending from the surface to the gondola.

The new camera returns to the principle of the Boutan camera, Dr. Ewing stated.

Science News Letter, November 4, 1944

ENGINEERING

Square Telephone Poles Used by Signal Corps

► SQUARE-SAWED telephone poles, cut on standard sawmill machines, are being used in war theaters by the U. S. Army Signal Corps for telephone lines, in place of the old-type round poles. Change from round to square poles, the War Department states, has resulted in savings in time, manpower and lumber.

In 100 miles of poles, 250,000 board feet of lumber may be saved by using square poles. They can be turned out many times more rapidly than the round type, as mill-made units. Square poles,

the Army found, are easier to store than round poles, with a great saving in space. There is also a saving in shipping weight of more than 800,000 pounds for 100 miles of the new poles as compared with the old type. In addition, they can be handled in the war theaters with far greater ease than the round type, and they are easier for the soldiers to set up.

The old type of pole, cut round from yellow pine stock, was impregnated with creosote, a heavy oily liquid obtained primarily from coal tar. The new square pole is protected against decay and termites by a green salt treatment. The green salt preservative, unlike creosote, is non-inflammable, consequently the fire hazard in storage and in transit is greatly reduced.

Douglas fir stock can be used in place of yellow pine stock with the green salt treatment, thereby releasing for other essential uses vast quantities of vitally needed pine. Douglas fir strongly resists the penetration of creosote, but the new method drives green salt preservative deep into the wood by means of air pressure and small incisions to insure uniformity of penetration. Many more poles can be processed at one time by the green salt method, than by the older creosote system.

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MEDICINE

Cellophane Strips Aid Production of Penicillin

► FASTER production and increased yields of penicillin are obtained when bags or strips of Cellophane are placed in the culture medium in which the penicillin-producing mold grows, Dr. Gregory Shwartzman, of Mt. Sinai Hospital in New York, reports. (*Science*, Oct. 27).

In one test, the mold growing with the Cellophane bag or open bowl started producing penicillin three days earlier than mold without the Cellophane. On the day when penicillin first appeared in the cultures without Cellophane, the concentration of the drug in the Cellophane cultures was already 30 times greater.

Observation that young colonies of the mold tended to develop nearer the side walls of the flask they grew in than towards the center of the surface of the fluid suggested that introduction of some supporting material would help them grow faster.

Even under conditions unfavorable for the production of penicillin, the Cellophane speeds production and yield.

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MEDICINE

Nobel Prize Winners

Honors for two years divided between work on vitamin K and research on electrical pictures of nerve activity and pain; Dam and Doisy share 1943 prize.

► THOUSANDS of men, women and newborn babies have been saved from bleeding to death and electrical pictures of human thought and pain are coming closer to practical reality as a result of the fundamental discoveries for which the Nobel Prizes in medicine for 1943 and 1944 were awarded.

Since 1938 patients with obstructive jaundice and with certain other conditions in which a dangerous bleeding tendency exists have been treated with vitamin K, the anti-bleeding vitamin. It gets its name, K, because the German and Scandinavian word for coagulation is spelled Koagulation, and this vitamin was discovered by a Danish scientist, Dr. Henrik Dam, now at Strong Memorial Hospital, Rochester, N. Y. For this discovery Dr. Dam shares the 1943 Nobel Prize in medicine with Dr. Edward A. Doisy, St. Louis University Medical School.

On May 3 of this year, Dr. Doisy and associates were granted patent rights on

pure, synthetic vitamin K, culminating many years of research on the chemical structure and method of synthesizing the vitamin. Ten years before, in June of 1934, the world first learned of the existence of this vitamin.

"Possible existence of another hitherto unknown vitamin, with ability to prevent hemorrhage, is seen in experiments reported by Dr. Henrik Dam, of the Biochemical Institute, Copenhagen," Science Service told its readers on June 26, 1934. (See SNL, July 21, 1934.)

"Chicks fed an experimental diet developed a disease very much like scurvy, the chief features being extensive internal hemorrhages," Science Service's account of Dr. Dam's report to the British scientific journal, *Nature*, continued.

"Large doses of anti-scurvy vitamin C in the form of lemon juice and ascorbic acid did not have any effect on the disease, but a diet consisting entirely of cereals or seeds plus salt prevented the occurrence of the hemorrhages.

"The cause of the disease must therefore be a deficiency in an antihemorrhagic factor different from vitamin C and occurring in seeds and cereals," was Dr. Dam's conclusion.

When this vitamin was first used to treat human patients it had to be given in what many of them must have thought was food fit only for chicks, dried alfalfa or dried fish meal. Thanks to the work of Dr. Doisy and many other biochemists, patients today can be given the vitamin as a synthetic preparation in a pill or by hypodermic injection.

Less dramatic and far harder for the layman to understand is the fundamental research on nerves for which Dr. Joseph Erlanger, of Washington University School of Medicine, and Dr. Herbert S. Gasser, director of the Rockefeller Institute for Medical Research, share the 1944 Nobel Prize in medicine. Yet modern methods of learning about the electrical changes accompanying nerve activity, including the familiar brain waves which scientists believe will some day be developed to the point of telling what a person is thinking about whether he wants to tell them or not, were started by Dr. Erlanger and Dr. Gasser. The history of these developments is briefly traced by Dr. R. W. Gerard, of the University of Chicago, somewhat as follows:

One hundred years ago changes in potential in active nerves were discovered with the aid of the then newly developed galvanometers.

"Another half century saw the invention of the string galvanometer, by the physiologist, Einthoven, to permit the measurement of the rapid flicks made by responding tissues which opened the era of electrocardiography. In the early twenties, amplifier tubes were used with the string galvanometers and shortly after with the Braun tube by physiologists at Harvard and Washington Universities. The latter, especially Erlanger and Gasser, were thus able, for the first time, to disentangle the impulses in one nerve fiber from those in others and to show that several types of fibers existed with very different conduction rates."

As a result of this work we now know, says Prof. Edgar Douglas Adrian, of Cambridge University and himself a Nobelist in medicine, "that the sensory fibers can be ranged in decreasing order of size, velocity of conduction and excitability to electric stimuli and that pain reactions are mainly, if not entirely, due to the smaller fibers."



CAMERA OF THE SEAS—This odd-looking apparatus is an underwater camera which can travel to the bottom of the ocean and automatically take its own pictures with a minimum of disturbance to animal life. Turn to the front cover to see one of its pictures.

MEDICINE

Penicillin Mist

Inhalations of very fine particles of the mold substance tried on patients with lung diseases such as pneumonia and bronchiectasis.

► A NEW METHOD of giving penicillin treatments which may be more effective in lung diseases such as pneumonia and bronchiectasis is being tried on patients at Huntington Memorial Hospital in New York. The method consists in having the patient inhale a mist of very fine particles of penicillin.

Tuberculosis might be treated by the same method, using a mist of promin or some other drug effective against tubercle bacilli instead of penicillin.

The method was developed by Dr. Vernon Bryson, at the Long Island Biological Laboratory. Treatment of the patients is under the direction of Dr. Edwin Grace, of Brooklyn.

First patient treated was a discharged Marine who had a lung infection. Poison from this "putrid, foul lung" had apparently reached his brain, causing symptoms of mental disease which kept him in a mental hospital for nine months. At this time the penicillin inhalation treatment was given. It did not by itself cure him, probably because the infection had gone on too long. But it did clear up the infection to the point where an operation could safely be performed. The operation consisted in removal of the lung. Since then the man has been getting well. His mental condition cleared up and he has left the hospital.

Penicillin inhalations given to a woman with bronchiectasis within 10 days reduced the amount of sputum she coughed up each day from an ounce and a half or two ounces to a teaspoonful. This striking improvement did not last, the amount of sputum increasing to about half its former level. However, she is "50% better than she was," Dr. Grace said.

The value of the mist inhalation method of giving penicillin or other drugs for lung diseases lies in the fact that it gets the drug directly to the site of the infection, Dr. Bryson explained in a report at a Huntington Hospital staff meeting. Studies with mice and rabbits have shown this.

The treatment is particularly suited to chronic lung infections in which areas of fibrous tissue have developed. These areas have relatively little blood supply

and are more or less walled off from the rest of the lung. Consequently penicillin or other drugs injected into the muscles or blood stream may not reach the site of infection in sufficient quantity to do any good.

The inhalation treatment is given with a nebulizer, which is a special kind of atomizer with a glass baffle. Compressed air or oxygen is used to force the penicillin solution against the glass baffle hard enough to break it up into very small particles. The particles are so small it would take 25,000 of them laid side by side to make one inch. Unless the particles are this small they will not get down deep into the lungs where the infection is. The size of the particles may be varied according to the size of the structure in the lungs where the infection is.

When taking the treatment, the patient is instructed to take a deep breath of the mist from the nebulizer and then to hold the breath as long as possible. Then another deep breath, and so on. Masks are not efficient for the treatment, since too much penicillin is wasted.

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GENERAL SCIENCE

Medical Research Teams To Study Explosion

► TEAMS of medical scientists have been sent to Cleveland by the Committee on Medical Research of the Office of Scientific Research and Development to obtain information on surviving victims of the gas explosion and fire disaster that killed 150 persons and injured 200.

Their first objective is to find whether a scientific study of the injured would be profitable for learning new facts about blast injuries and burns and for developing better methods of treating such conditions which are both a war and peace-time medical problem.

Dr. Joseph T. Wearn, professor of medicine at Western Reserve University School of Medicine, Cleveland, and chief of the division of physiology of the Committee on Medical Research, personally went into the situation very carefully immediately after the disaster. On his

arrival in Washington to confer with other committee members, it was decided to send teams of scientists to Cleveland to carry on in his absence.

The blast effects were very serious, Dr. Wearn said. All the victims were either killed or escaped with very slight burns, mostly the flash burn variety. Only about eight or 10 survivors with serious burns are now in hospitals. A number of persons are still unaccounted for, having been in the heart of the explosion area and presumably killed by blast or fire.

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ASTRONOMY

Galaxies Group Enlarged

Discovery of two new universes outside our own may bring us closer to solving the riddle of how our world came into existence.

► DISCOVERY of two new members of our local group of galaxies, vast number of stars whirling through space together, may bring us closer to solving the riddle of how our world came into existence. This brings to 13 the number of galaxies, close neighbors to our own galaxy or Milky Way, with which we are familiar.

The two faint nebulae, representing previously unobserved stages through which a stellar system passes in changing from a nebula which is either round or elongated in shape into a globular group of stars, are reported by Dr. Walter Baade of the Carnegie Institution's Mt. Wilson Observatory, Pasadena, Calif., (*Astrophysical Journal*, Sept.). Known to astronomers by the New General Catalogue numbers of 147 and 185, the nebulae in structure differ considerably from typical elliptical nebulae which become continually brighter toward the center and gradually get fainter toward the edge.

The pair, Dr. Baade reports, seem to be intermediate in form between systems like NGC 205, in which it is just apparent that the usual distribution of stars in elliptical nebulae is no longer being followed, and the Sculptor and Fornax systems, globular systems where so few stars seem to be grouped together that observers hesitate to claim that they belong to the group of elliptical nebulae.

"It seems that a marked change in the internal structure of the elliptical-type nebulae takes place as we reach the systems of lowest luminosity," Dr. Baade states. The strong concentration of stars toward the center and the central nucleus gradually disappear. In one nebula investigated the central nucleus was faint, in the other it was entirely missing.

For years elliptical nebulae have puzzled astronomers anxious to delve deeper into the secret of their creation. It seemed impossible, even by the most powerful instruments, to photograph the individual stars. It has recently been discovered, however, that when red-sensitive plates were substituted for the blue used hitherto, stars just beyond the reach of the blue-sensitive plates could be photographed.

By means of red-sensitive plates nebulae can now be resolved with the 100-inch telescope if their distance is not greater than 300,000 parsecs or about 980,000 light years. Since this distance coincides with the distance adopted for the outer limit of the local group of galaxies, ability to resolve the nebula into stars provides a convenient criterion by which nebulae within the "family circle" can be distinguished from those outside of it.

The pair of elliptical nebulae chosen by Dr. Baade are about the same distance from us as the great Andromeda spiral, now visible high in the evening sky, near which they are located.

Both systems were easily resolved into stars on the red-sensitive plates, the brightest stars in the groups appearing to be about as brilliant as those in Messier 32, NGC 205 and the inner part of the Andromeda nebula, recently investigated by Dr. Baade.

Showing only an ill-defined elongated

patch of faint nebulosity by ordinary plates, under red exposure NGC 147 appears as a large star cloud. Although its shape could only be guessed at before, it now seems to be definitely ellipsoidal in structure. Its absolute magnitude is about the faintest thus far observed in a galaxy, but it is clearly visible because of its nearness to us.

Long known to have two dark clouds near the center, on red-sensitive plates the individual stars of NGC 185 can easily be distinguished. Considerably brighter than its companion, the nebula may well be described as a slightly elongated, giant globular cluster of stars.

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ORDNANCE

One-Piece Tops for Tanks Have Turtle-Back Contours

► ONE-PIECE tops for war tanks are the subject of patent 2,361,129, granted to W. M. Sheehan of Philadelphia and S. T. Wharton, Jr., of Ridley Park, Pa., and assigned to General Steel Castings Corporation of Granite City, Ill. In this design, the armor shell is also the supporting frame for the turrets and other structures. A turtle-back contour, very desirable for defensive purposes, is achieved.

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OUTWEARS RUBBER—Originally developed to prevent gear breakage in the event of jamming, a unique type of power transmission involving rubber rings that mesh with metal gears on revolving turret machinery was in use in the plant of a large radio manufacturer, before the rubber shortage. In the course of the rubber conservation program, it was found that when the rings were made of compar, a vinyl resin derivative compounded by Resistoflex Corporation, their service-life was increased five times.

NUTRITION

Protein in Diet Unchanged

The quality and quantity of this important nutrient have not changed since rationing, and great quantities can safely be spared for relief abroad.

► THE PROTEIN in the average American diet has not changed in either amount or quality since food rationing, Dr. R. J. Block, of the New York Medical College, Flower and Fifth Avenue Hospitals, declared at the meeting of the American Public Health Association, in New York.

His statement was based on a recent personal communication from Dr. Frank Gunderson of the National Research Council as well as on his own biochemical studies of the quality of protein in various foodstuffs.

"The protein reserves of this country are very large," Dr. Block gave as his own opinion, "and if properly handled, great quantities of proteins and protein concentrates can be sent abroad for relief and rehabilitation without in any way harming the American diet."

So long as there is enough to eat and whatever the diet, especially if there is plenty of bread and flour, the average person will get enough protein, Dr. Block said. The question, therefore, is one of the quality of the protein. This is measured by its content of the 10 essential amino acids, essential because they are required for growth and development and cannot be synthesized from other chemicals in the body of growing mammals.

Proteins of animal origin, such as meat, fish and eggs, are generally considered superior in quality to those of plant origin, such as the protein in corn, wheat and other grains. Certain proteins of plant origin, however, are decidedly superior to some of animal origin, Dr. Block reported.

Egg proteins, he found, are the best balanced proteins of any he studied. Muscle proteins appear to have the same amino acid composition whether from steak, hamburger, chicken, fish or seafood. The protein nutritive value of various meats will vary depending on the "cut." A poor cut of meat, which is full of collagen and elastin will not, he said, have the protein value of one composed largely of muscle tissue with a minimum of connective and elastic substances.

Among proteins of plant origin, Dr. Block found that rice and oats are some-

what lower than milk and meat in lysine, but reasonably well supplied with all the other essential amino acids. Wheat gluten is markedly deficient only in lysine, while corn meal protein is deficient in both lysine and tryptophane.

A whole wheat cereal, especially with wheat germ added, was found superior to farina type products, rolled or puffed wheat, among a number of commercial breakfast foods studied. This and similar findings on corn and rice breakfast foods suggest that heat and mechanical treatment may have a harmful effect on certain amino acids.

A puffed oat cereal, on the other hand, showed no significant changes from the unpuffed product.

Yeast has an excellent balance of essential amino acids, Dr. Block found in his study of plant protein concentrates. Soy proteins also seem to be good sources of the amino acids except for

cystine and methionine. Since corn gluten is abundantly supplied with methionine, a mixture of soy and corn should be a very nourishing food.

Sunflower seed proteins have considerable promise as a protein supplement. They are a popular article of diet in Russia, but the solvent extracted meal is just being introduced into this country.

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CHEMISTRY

Several Rubber Patents Assigned to Goodrich

► SEVERAL patents on rubber and its products have been assigned to the B. F. Goodrich Company by their inventors. One, covering a new type of synthetic rubber, is covered by patent 2,360,864, issued to C. F. Fryling of Silver Lake, Ohio. It is on a synthetic rubber composition consisting of a butadiene-acrylonitrile copolymer, with the addition of dibutyl meta cresol or a related compound to impart the necessary degree of tackiness. This tackiness or stickiness is necessary in the successful fabrication of the rubber; it has been difficult to obtain with previously used materials.

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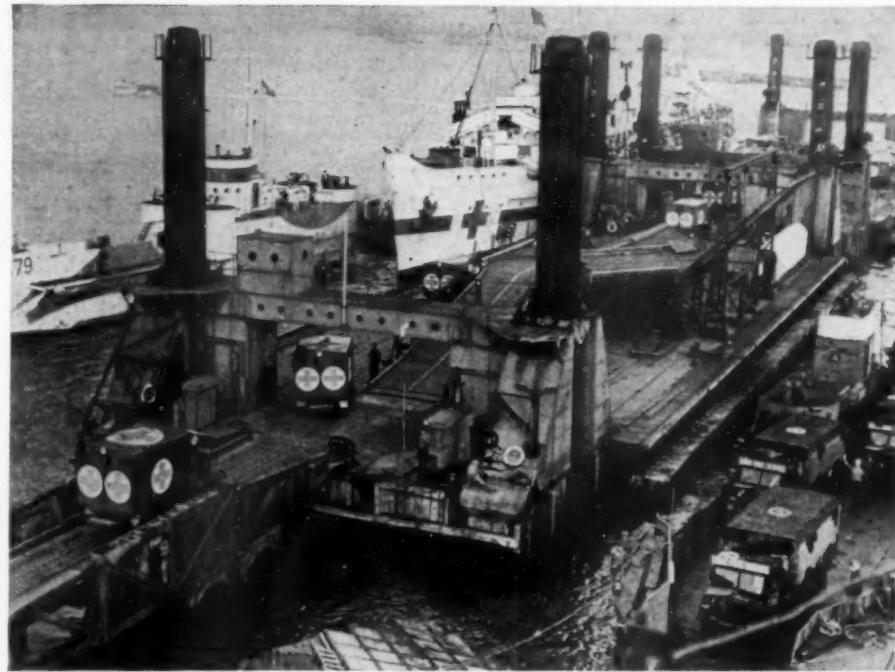
MAN-MADE HARBOR—In the invasion of Normandy, we did not have to depend on the harbors damaged by the enemy, but brought our own. In front of the prefabricated pier in this aerial photograph, is seen a breakwater of concrete caissons and blockships. This is an official British photograph.

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PSYCHOLOGY

How To Handle Traitors

An escaped Dutch Army Medical Officer warns that any idea of segregating them is folly. This would only breed a pure culture of hatred.

► ANY IDEA the Allied and liberated nations may have of rounding up and sending to concentration camps the traitors who helped in the Nazi conquest would be a mistake, in the opinion of Dr. A. M. Meerloo, major in the Royal Netherlands Army.

Maj. Meerloo, a psychologist, apparently had plenty of time between the Nazi occupation of Holland and his own escape to study treason among his unfortunate compatriots. Suggestions for postwar handling of traitors gleaned from this study and reported by Maj. Meerloo to the British Psychological Association now appear in the *Lancet* (Sept. 2), medical journal published in London.

"It would be folly to segregate traitors together," he said. "That would be to breed a pure culture of hatred."

He explained this by pointing out that "some people can only conquer their sense of inferiority by a persistent attitude of dissatisfaction. They prefer the secrecy of clique and schism to productive work with the community."

In the course of his practice Maj. Meerloo came across several people who later became traitors. These people could

not have been called wicked, he said. They were rather of the type that is easily influenced by current ideas and theories. Those who tried to intimidate him with their fascism were never strong characters. They were instead those who were disappointed with life, "the frustrated who transferred their feelings to political phantoms."

Just as the hypnotic force of fascism strengthened the fascist tendencies of men, so Maj. Meerloo sees hope that a similar hypnotic force in the way of mass suggestion toward good may neutralize traitors.

Pointing out that a sense of guilt is one of the most fertile sources of betrayal, injustice leading to hatred of the victim and then to further injustice, Maj. Meerloo warned that "our own guilt may cause us to forgive" the traitors too easily.

Letting a man persist in his personal discontent and resentment against society is dangerous. The way to remedy such antisocial feeling, Maj. Meerloo suggested, is to allow each man freedom to criticize and to create in him a sense of responsibility for his views.



HARBOR PROTECTION — By opening special valves, 146 caissons like the one in this British photograph (above), were sunk into position in the channel for the Normandy invasion. Anti-aircraft guns were placed on the top of most caissons as additional protection of the harbor. These ambulances (left), bring the wounded right up to hospital ships tied at the LST pier head at the British prefabricated harbor on the coast of Normandy.

"In a democracy the opposition has an important part to play," he pointed out. "A democracy conscious of its own ideals should be able to eradicate psychological imbalance of this kind."

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ORDNANCE

Extensible Smallarms Stocks Invented at Arsenal

► AN EXTENSIBLE stock for submachine guns and other small arms is covered by patent 2,360,881, obtained by John L. Lochhead, civilian employee of the great arsenal at Springfield, Mass. Patent rights are assigned, royalty-free, to the government. The stock, with its shoulder rest, consists of a pair of parallel rods or bars that slide snugly forward under the weapon when in the collapsed condition, instead of folding around to the side as in weapons of existing design.

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MEDICINE

New Chemical Better Than Adrenalin for Asthma

► A NEW chemical, said to be better for acute asthmatic attacks than epinephrine, or adrenalin as it is also known, is reported by Dr. M. L. Tainter, of the Winthrop Chemical Company, and Dr. W. M. Cameron, Dr. L. J. Whitsell and Dr. M. M. Hartman, of Stanford University School of Medicine, (*Journal of Pharmacology and Experimental Therapeutics*.)

Ethylnorsuprarenin is the name of the new chemical. It is a colorless, odorless, crystalline powder with a bitter taste chemically described as 1-(3, 4-dihydroxyphenyl)-2-amino-1-butanol. It may be injected under the skin, into the muscles or into the veins. It takes effect in from one to five minutes, the effect lasting 20 minutes to one hour. Fewer reactions such as pain over the heart, nausea, vomiting and nervousness were observed in the same patients when this drug's effect was compared with that of epinephrine.

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SAFETY

Reflecting Pavements Promote Driving Safety

► REFLECTING pavements that send back to the driver more of the light from the headlights of an automobile driven at night promote night-driving safety both to the driver and to pedestrians on the streets. This conclusion has been reached by Dr. Eugene C. Bingham of Lafayette College, who during the past few years has experimented with such reflecting pavings. He took his idea from the reflecting white cement curbs successfully used in many states.

Ordinary pavement ahead of the driver lights up poorly, he explains, because it has a comparatively smooth surface that reflects the light onward, to become a glare troublesome to approaching cars. Very little is reflected back to the driver, but it is this reflected light that makes the paving visible.

In his studies Dr. Bingham found that the light beam striking the pavement some 300 feet ahead of the car does so at an angle of roughly one-half of one degree and the small amount of the light reflected back has only one-hundredth of its original intensity. A controlled means of creating backward reflection and at the same time maintaining the same satisfactory driving sur-

face is what is needed, he states.

Dr. Bingham's proposal, based on his experiments at the college, is a driving surface made up of a series of bricks laid on a level, solid foundation, each brick being tilted up at an angle of one-half a degree, with the exposed edge bright in color, hardened and enameled. The light will graze the sloping surface but will be reflected back from the protruding edges. This will enable the driver to see a large area of pavement.

If the surface has its reflecting edges less than one-half inch wide and the bricks are properly arranged, it is possible to keep the tires of the car resting continually on the ends of the long, sloping planes and thus avoid the possibility of vibration and hum, Dr. Bingham finds.

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GENERAL SCIENCE

National Academy Resumes Its Scientific Sessions

► THE NATIONAL Academy of Sciences is resuming scientific sessions with its autumn meeting this year to be held Nov. 15 and 16. Since Pearl Harbor only brief business sessions at spring and fall meetings have been held by this top scientific body.

Science at war will be the subject of the scientific sessions with leading authorities speaking. The papers will deal with metallurgy, geology, the weather, aviation medicine, nutrition, materials, penicillin, and shock.

The public will be admitted again to the scientific sessions, which will be held in the U. S. National Museum auditorium instead of the hall of the National Academy which has during the war been cut up into temporary offices.

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HORTICULTURE

Cold-Resisting Apples For U. S. S. R. Farmers

► SEVERAL new hardy apple varieties, specially bred for resistance to Russia's winter cold, will be recommended to collective farmers in the U. S. S. R. These hybrids, which excel all existing Russian varieties in flavor, aroma and heavy yield, were developed by Dr. S. Chernenko, who directs the plant selection department of the Michurin Central Genetics Laboratory. Production of the new apple sorts is reported by the Soviet Scientists Anti-Fascist Committee.

Science News Letter, November 4, 1944

IN SCIENCE

MEDICINE

Anthrax in Mice Helped By Penicillin Treatment

► ANTHRAX, for which no completely satisfactory treatment has yet been developed, may yield to penicillin, it appears from a report by Dr. F. R. Heilman and Dr. W. E. Herrell of the Mayo Clinic.

In trials with mice, they found that slightly more than half the animals treated with penicillin could be protected against 10,000 times the lethal dose of anthrax germs even when treatment was not started until 16 hours after the mice had been inoculated with the germs. In other trials, starting treatment within an hour and inoculating fewer germs, all the treated mice survived and all the untreated ones died.

Anthrax, which humans get from hair, hides, bristles and wool of infected animals, has apparently decreased in incidence and fatality in recent years. It is still, however, an important disease problem in certain regions. Antiserum, arsenicals and sulfa drugs have proved of some value in its treatment but their use still leaves something to be desired, the Mayo doctors state.

Science News Letter, November 4, 1944

ENGINEERING

Talc Used As Lining For Fireboxes in Boilers

► TALC AS a firebox lining in boilers and locomotives is being used instead of the customary firebrick in the Soviet Union. It is found to withstand a temperature of 1700 degrees Centigrade, which is higher than the usual temperatures under such boilers. Talc is soft and easily worked, so that bricks cut from it may be given any shape. It heats more rapidly than firebrick, and cools more slowly, resulting in a 25% economy in fuel.

The proposal to use talc for firebox linings originated here with Prof. Pevzner, winner of a Stalin prize. Russia has extensive deposits of suitable talc. It is less difficult to make than conventional firebrick. It is pronounced by industrial concerns in the U.S.S.R. as a cheap and economical substitute.

Science News Letter, November 4, 1944

THE FIELDS

MEDICINE

Gum Arabic Helpful in Kidney Disease Treatment

► A TREATMENT for kidney disease with dropsy which "restores many of the patients to work and eases the suffering of those who are bedfast, though it does not cure the disease," is reported by Dr. Raymond E. Smalley and Dr. Melvin W. Binger, of the Mayo Clinic, (*Journal, American Medical Association*, Oct. 28).

The treatment consists essentially in a diet containing little or no salt, a limited amount of fluid and an increased amount of protein food; three times daily doses of potassium nitrate, and, when kidney function is good, injection into the vein of a solution of gum arabic, or acacia.

Following up 109 patients given this treatment between 1937 and 1943, the Mayo doctors found that 72 were alive and 25 dead. On 12 no information was obtainable.

Of the 72 living patients, 49 were doing a full day's "substantial" work as business executives, stenographers, farmers, housewives and students. One woman was teaching school in addition to caring for her house and family. Two were slightly handicapped, 19 were working at least half a day, and two were bed patients. One of these was a man 74 years old.

No harmful effect of the acacia was found. How it acts is not certain but it does, the doctors report, facilitate excretion of salt and water, thus helping to relieve the dropsy.

Science News Letter, November 4, 1944

PUBLIC HEALTH

Scrub Typhus Kills Doctor In Hunt for Vaccine

► LATEST martyr to science, whose name might well appear on the rolls of dead heroes of this war, was Dr. Richard G. Henderson, senior assistant surgeon, U. S. Public Health Service, who died at the Naval Hospital in Washington on October 20.

Tsutsugamushi disease, also called scrub typhus, killed Dr. Henderson as he was working on the development of a vaccine to protect American fighting forces from this plague of the Pacific.

How he contracted the disease is a mystery. Ordinarily it is spread by mites, but there are no mites at the National Institute of Health where Dr. Henderson was working. Nor was there any laboratory accident to account for his getting the infection. The 32-year-old scientist started working on the disease three months ago, at the request of the military authorities.

Scrub typhus is caused by germs belonging to the rickettsia family to which also belong the germs of typhus fever and Rocky Mountain spotted fever. A rash, enlarged glands and lung inflammation like pneumonia are the chief symptoms. Dr. Henderson died of the pneumonia of the disease. No specific treatment or "cure" is known for scrub typhus. It is fatal in about seven per cent of the cases.

Science News Letter, November 4, 1944

AERONAUTICS

Latin Americans Receive Aviation Training by CAA

► CONTINUING its "good neighbor" policy of stimulating interest in aviation in neighboring American republics, the Civil Aeronautics Administration, in co-operation with the State Department, recently announced that applications are now being received for 128 aviation training scholarships in 19 Latin American countries under the CAA's fourth Inter-American training program.

These scholarships, financed by the State Department, entitle successful candidates to one year of training in the United States at CAA selected schools. Provision has been made under the present program to train 19 pilots, 37 mechanics, 35 communications technicians and traffic control workers, and 37 others who will receive on-the-job training in other aviation activities.

Examinations will be given on Dec. 1, and selection of successful candidates will be made by committees in each of the 19 countries. Training will begin in the United States about two months later.

To date more than 650 persons from other republics have been trained, or are now completing training, through the CAA program. In their respective countries, these trainees will play an important role in aviation development.

In Brazil and Mexico, representatives of the CAA are already at work assisting the governments of those two countries in organizing and carrying out civilian flight training programs.

Science News Letter, November 4, 1944

MEDICINE

Radium Successful for Treating Aviator's Ear

► RADIUM treatment for aviator's ear is enabling men grounded because of the condition to fly again, it appears from a report by Maj. E. P. Fowler, Jr., of the U. S. Army Medical Corps (*Journal of Laryngology and Otology*).

Aviator's ear, technically termed aerotitis media, is an inflammation of the middle ear caused by the pressure changes between the middle ear cavity and the surrounding atmosphere.

Men most susceptible to repeated attacks of this painful and sometimes deafening condition, Major Fowler found, were those who had bands of overdeveloped lymphoid tissue, like tonsil and adenoid tissue, back of the nose near the opening of the Eustachian tubes to the ears. Although the amount of such tissue in the flyers was not large, it seemed to be enough to clog their Eustachian tubes if they flew at high altitudes or engaged in dive bombing.

In civilian practice in New York City, Major Fowler had used radium to shrink down excessive lymphoid tissue about the Eustachian tubes of children. Partial obstruction of these tubes by the tissue is believed to cause progressive deafness.

The same kind of treatment has been given with good results to more than a hundred men of the air force and ground force at a U. S. Army general hospital in England. It takes three treatments before the condition improves. Treatments are given every three to six weeks up to four or more treatments.

Science News Letter, November 4, 1944

METEROLOGY

Grapefruit Suffered Most In Florida Hurricane

► HURRICANE damage to the Florida citrus crop, as estimated by U. S. Weather Bureau observers in the field, was most severe in the grapefruit orchards, where 12 to 15 million boxes, representing 35% to 45% of the crop, were lost. Oranges suffered losses of four to six million boxes, or 10% to 15% of the total crop; early oranges were damaged more than late varieties. Relatively little permanent harm was done to the trees.

Outside of the coastal storm zone, the country continued to enjoy almost perfect harvest-season weather, with mild, sunny days and increasingly frosty nights. Corn picking, however, is greatly delayed because of the abnormally wet ears.

Science News Letter, November 4, 1944

CHEMISTRY

Lignin Put to Work

This partner of cellulose in wood may some day be the source of gasoline, dye stuffs and insecticides; is already being used to improve soils and build roads.

By MARTHA MORROW

► LIGNIN, partner of cellulose in wood, may some day be the source of gasoline, dye stuffs and insecticides. Metals may be kept from rusting by a coating of lignin, and bridges and buildings made of odd pieces of wood bonded together by lignin.

Today lustrous ebony plastics and inexpensive building materials are being made from this natural substance, all too frequently regarded as mill waste. Lignin is already being used to improve soils and build roads. It is well adapted for electrical insulation equipment.

The future of lignin, the uninviting and often unwanted product left when cellulose is extracted from wood, depends on the skill, ingenuity and knowledge of chemists. Once we know more about lignin, a vast new field will open up, possibly as broad and varied as that of cellulose, one of the great fundamental materials of modern civilization.

Secret Sought

Chemists in secluded laboratories throughout the country are today seeking to discover the secret of this raw material. Some, interested in our woodland streams, strive to make the streams purer by discovering a profitable use for this material which today is polluting them. Others seek more remunerative ways of employing sawdust and wood chips, millions of tons of which are wasted annually. Others, desiring to keep our country green with trees, hope to develop new uses for wood products which would help make the business of growing trees economically more attractive.

If a use of lignin can be found which would raise the selling price only one cent a pound, it has been estimated that the cost of producing ethyl alcohol from wood waste in a plant now under construction in Oregon would be cut almost in half. If salvaging lignin from the waste liquors of pulp mills could be proved worthwhile, added profits would go to the paper industry for keeping the streams, formerly polluted with mill

waste, more inviting to wild life and vacationists.

Lignin is found along with cellulose in most plants, in their leaves as well as in the wood itself. It may well be conceived as the cementing material that binds the cellulose fibers together in the wood structure. Without it wood would be limp and flexible.

Composition Known

Chemists know in general what lignin is composed of, but they don't yet know how it is put together. A typical wood lignin contains approximately 64 per cent of carbon, 5.6 per cent of hydrogen and 30.4 per cent of oxygen. It is not a carbohydrate because the atoms of hydrogen and oxygen are not in the proportion of two to one, which is a characteristic of the molecular structure of carbohydrates such as cellulose.

The atomic proportions in lignin are, roughly, carbon 46, hydrogen 48, and oxygen 15. Just how these are linked together is a question chemists today are trying to solve. After it is separated from wood, lignin is found chiefly in the form of dissolved lignin or insoluble lignin.

Dissolved lignin is a by-product left from paper pulp manufacture. Some of it comes from the sulfite cooking process and some comes from the alkaline cooking process, both of which are used in making the pulp from which paper is manufactured. Papers made by the first process are largely bond papers, book papers and writing papers. When such pulp is highly purified, it is a raw material from which rayon is made. Papers made by the alkaline-cooking process consist largely of kraft papers, most of which is used in wrapping and making containers.

Lignin solutions from sulfite mill wastes may be evaporated. Concentrated lignin of this type has been used rather extensively as a road binder to control dust. Lignin may be recovered from the wastes of the alkaline pulping process by a simple chemical treatment which causes it to become insoluble. In this form it is used chiefly as a bonding agent for plastics with a fiber base.

There are possibilities of utilizing the ability of lignin to combine not only with fiber but with other proteins as well.

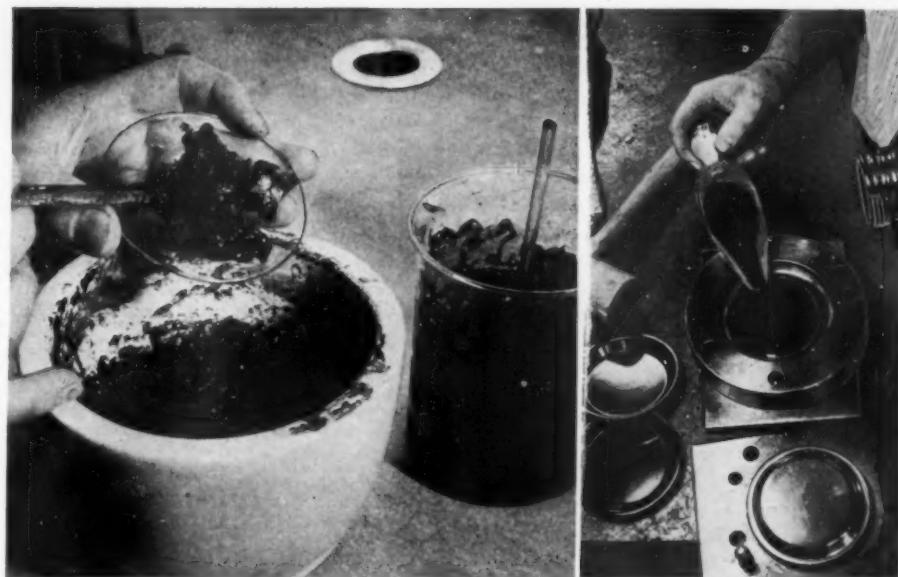
Insoluble lignin is derived chiefly as a residue from the wood sugar process. In the saccharification of wood, the cellulose is converted into sugars by hydrolysis and these sugars may be fermented to ethyl alcohol or used to produce feed yeasts, and thus make protein feed for livestock. One ton of dry soft-woods, such as pine or fir, will yield approximately 1,100 pounds of sugars. As a by-product of this process, about 600 pounds of lignin are produced which may be dried to a fine powder.

What to do with this highly complicated and potentially valuable material is engaging the attention of chemists in both public and private laboratories.

Since it contains about 64 per cent of carbon, lignin can be used as a fuel. It gives off as much heat upon burning as



PRACTICAL APPLICATIONS —
Dr. Eduard Farber, chemist with the Timber Engineering Company, is primarily concerned with finding practical uses which can be made of this little-known material. Photograph by Fremont Davis, Science Service staff photographer.



BASIC MATERIAL—The black, messy substance with which lignin chemists must work (left), promises to be the basis for a wide variety of new uses. Jet black ash trays (right), are made in the experimental production of plastics from lignin at the Forest Products Laboratory by filling the polished mold with powder made from wood wastes.

brown coal or lignite, and ignites in air at a temperature of 150 to 200 degrees Centigrade. But this is a relatively low-grade use of lignin.

One use of lignin now being explored is as a soil conditioner. Insoluble lignin, like other lignins, is related to humus in the soil, both humus and lignin having the same parents. One of its outstanding characteristics is that it is adsorbent. Because of this quality and its close relationship to humus, it will adsorb and hold chemicals valuable as plant nutrients, from simple inorganic substances to highly complicated proteins, and release them in a form readily utilized. Lignin isolated from sulfite liquor wastes may also be used after special treatment for this purpose.

May Be Purifier

This same quality of adsorption suggests the use of lignin as a purifier. From the air it will take acid, benzene and other gases. From solutions it will adsorb heavy metals, phenols and other chemicals often found in waste waters from chemical manufacturing plants. The insoluble form of lignin may be valuable in the war against stream pollution.

Wood alone, untreated, is somewhat plastic at high temperatures and by the application of sufficient pressure small particles, such as sawdust and shavings, can be pressed into a compact mass.

Such pressed material, however, is not strong and disintegrates rapidly when soaked in water.

Lignin, when separated from the other constituents of wood, is more plastic, although it tends to crack and crumble when used alone. Much attention is being given to the use of lignin as a plastic when combined with plasticizers and fibers.

If wood is partially hydrolyzed, only part of the cellulose is converted into sugar. This wood product, with a high lignin content, may be mixed with auxiliary plastics or plastic-forming constituents and be molded under heat and pressure. The resulting materials are highly resistant to water and acids, and have considerable flexural strength because of the cellulose fibers they contain.

A similar product is made by removing all the natural lignin from wood, leaving the cellulose. Then lignin of the type obtained from the alkaline-cooking process is introduced. It not only covers the fibers, but also impregnates the cellulose cells and pores. The product is hard, resistant to water and acid, a poor conductor of heat and electricity, and can be molded.

Sheets of laminating paper, made by running pulp with a high lignin content on a paper machine, after being treated with phenolic resins, are bonded together under heat (*Turn to page 300*)

Maintenance and Servicing of Electrical Instruments

By

JAMES SPENCER

In charge of Instrument and Relay Department, Meter Division, Westinghouse Electric & Manufacturing Co., Newark, N. J.

This book should be of great value to all those whose problem it is to keep in operation the electrical instruments on vital war production as well as those on planes, signal equipment, tanks, ships, guns and other armament.

The electrical instrument industry has expanded more than 30 times its normal production, but its service facilities in general have not kept up with this pace. Some electrical instrument manufacturers do practically no servicing and cannot promise early return of the few instruments they accept for repairs.

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Do You Know?

New York state has over 4,000,000 acres in farm woodlands.

Game species of *migratory waterfowl* in North America have increased nearly 400% in the past nine years.

About 90% of all *salmon* caught by United States fishermen is taken in Alaska.

Fruit production in the United States may be at least 20% greater this year than in 1943, according to national estimates.

While *natural gas* and *petroleum* are found together and much of the gas supply is obtained from wells yielding both, the greater part is from wells which contain gas only.

The *bonehead dinosaur*, known to scientists only in relatively recent years, had a dome of solid bone with bumps and knobs; more properly it is the *troodont* dinosaur, technically *Pachycephalosaurus*.



24-HOUR VITAMIN ANALYSES NOW TAKE 10 MINUTES

A particular type of analytic procedure for a certain vitamin constituent formerly required 24 hours in the laboratories of Merck & Co., Inc., makers of fine chemicals, drugs and vitamins. Analysis wasn't, of course, an every-second-on-the-job task; but Merck's men wanted to speed up the operation, if an accurate, not-too-complex method could be found.

They were, therefore, much interested when we announced the L&N Electro-Chemograph—an instrument which provides automatic records of a dropping mercury electrode's current and potential. After investigation, Merck secured one of these instruments.

Results are most satisfactory. The 24-hour analysis now takes 10 minutes, and results check with "wet" methods. The record appears, in ink, on the Micromax Chart; and it appears as rapidly as the analysis proceeds, so that any desired changes in routine can be quickly seen.

For further information, see Bulletin E-94(1).

LEEDS & NORTHRUP
ELECTRICAL INSTRUMENTS • THERMOMETERS • AUTOMATIC CONTROLLERS • HEAT-TREATED FURNACES
Jrl. Ad E-94(5C)

From Page 299

and pressure. An extremely hard, board-like material results which is quite different from the paper itself. This material, named papreg by the U. S. Forest Products Laboratory, which has done much research on lignin, is being used for electrical insulating panels. It can be sawed, turned and drilled just like hard wood. It is durable enough to form skids for planes landing on ice and snow.

The grain of the individual sheets of laminating paper may be made to run in the same direction. Or the grains may be crossed, in the same manner that grains of plywood veneers are crossed, thus creating desired strengths in various directions.

Another laminated product in which lignin has an important role consists of

sheets of partially hydrolyzed wood, to which some phenolic resin has been added. These sheets may be run out something like paper and compressed together into panels. They are, in a sense, a sort of synthetic plywood which may come to have wide uses as a cheap structural material.

By controlling the proportions of lignin and cellulose under special treatment, products entirely different from wood may be made which meet needs that wood, in its natural state, cannot fill.

If you would like to have samples of the dry lignin powder, plastic made from lignin and a little cellulose, and a sample showing how the individual sheets are laminated into a solid, hard board, you can secure the Lignin Unit of THINGS of science, a kit prepared by Science Service, by sending 50 cents to SCIENCE NEWS LETTER, 1719 N Street, N. W., Washington 6, D. C., and asking for THINGS unit No. 47.

Science News Letter, November 4, 1944

ELECTRONICS

3-Dimension Electron View

Pictures revealing the shape of ultra-microscopic crystals of magnesium and other metals demonstrated; pin point looks like a vast mountain range.

► THREE-DIMENSIONAL pictures of views through an electron microscope, revealing the shape of ultra-microscopic crystals of which magnesium and other metals are composed, were demonstrated publicly for the first time at the 29th annual meeting of the Optical Society of America. The point of a common pin can be made to appear as vast and rough as a mountain range when photographed through an electron microscope, and enlarged to 100,000 diameters on a three-dimensional Polaroid vectograph. In these three-dimensional pictures, it is now possible to study and measure the shape and space characteristics of minute structures that are extremely difficult to see in ordinary photographs.

The demonstration of techniques in applied electron microscopy was made by Robert D. Heidenreich of the Dow Chemical Company, Midland, Mich., where the electron microscope has been used in the investigation of corrosion phenomena in magnesium alloys.

"The combination of the electron microscope and the Polaroid vectograph process offers metallurgists a peep hole into the microcosmos," Mr. Heidenreich declared. "We can now examine the shape of micro-structures just as one can ex-

amine the formation of rock in a quarry. The increasing store of knowledge of new characteristics of metals will doubtless be utilized in the development of new alloys that perform even better than those we have today."

Science News Letter, November 4, 1944

INVENTION

Vehicle Inside Own Tread For Use in Marshes

► A VEHICLE that runs inside its own tread is the unique invention on which O. F. Arthur of Belle Vernon, Pa., has received patent 2,361,165. Tanks and tractors ordinarily ride between their treads, rising above them. In Mr. Arthur's invention a very wide, mat-like tread, wider than the whole track of the truck or other vehicle, loops completely overhead, with suitable guides to keep it from going astray. This type of vehicle is expected to be useful especially in very marshy country.

Science News Letter, November 4, 1944

Zacaton root, *Pirelema crinitum*, is raised and used in Guatemala for making brooms and brushes, sold largely in Cuba and Argentina.



Pattern for Survival

► MOST FAMILIAR higher plants meet the problem of winter survival in one of three ways: (1) Annuals, that die in autumn, trust their hopes for the coming generation to seeds; (2) Perennial herbs die down to ground levels, but keep their underground rootstocks, roots, bulbs or corms alive; (3) Trees, shrubs and woody vines let their leaves die, and keep next spring's leaves and flowers tightly packed in buds, backed up by stored foodstuffs in the stems.

No matter which of these three patterns for survival is used by any given species, the living contents of seed, bulb or bud receives much the same kind of internal protection. It is useless to "wrap them up warm," as old-fashioned nursery rhymes used to tell us. This is reasoning from human analogy—that is, from the viewpoint of a warm-blooded animal. Plants are not warm-blooded; they have practically no internal temperature resources that even the snuggest fur wrappings would preserve.

The living stuff in the survival organs must therefore be able to endure temperature drops to far below freezing point and still not freeze to death. It must also be able to hang onto a necessary minimum of moisture against the insistent pull of winter-time evaporation when no sap is rising to replace water losses.

This is accomplished principally by having as low a water content as can be managed, and yet stay alive. As everybody knows, actively growing plants in summer are very moist and sappy. Their cells are large, with big water-spaces in them. But the cells in over-wintering seeds and buds are small, and their contents consist of thickened protoplasm, of the approximate consist-

ency of dry cheese, together with condensed storage foods like oils, starches, dense sugar solutions, and other carbohydrates that resemble mucilage or gelatin.

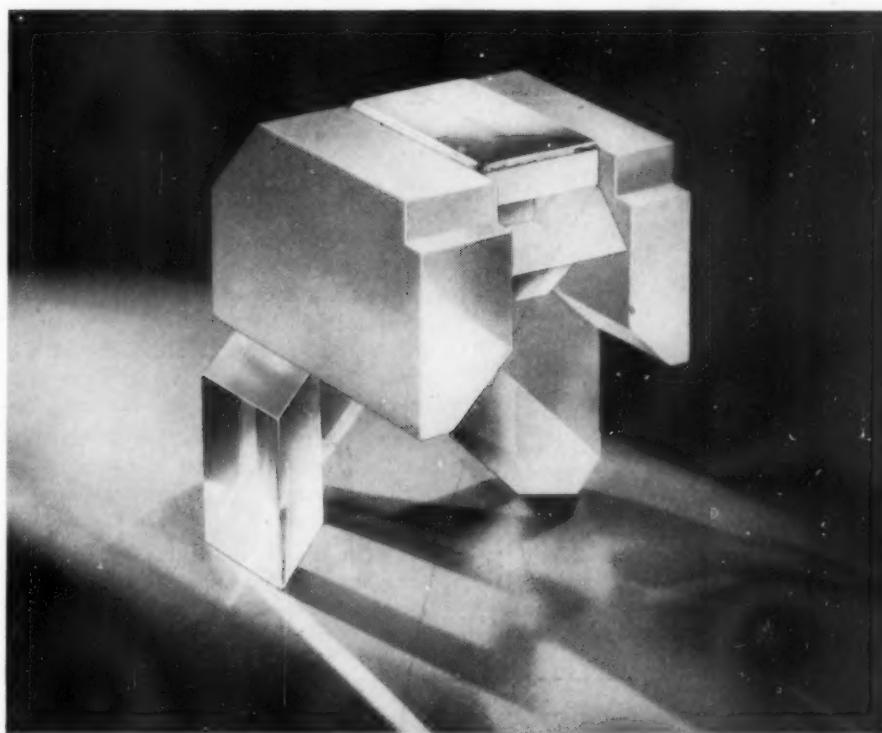
Substances like these are far better able to resist both freezing and drying out than are the watery saps of summer. You can make a rough test for yourself if you like: Just set vials of water, table syrup and mucilage, respectively, in the ice cube compartment of your refrigerator

(or outdoors on a freezing night) and see which of them freezes first.

Science News Letter, November 4, 1944

To increase *poultry production* in the Ukraine, the Soviet government is constructing 33 incubation stations in 13 of the 16 Ukrainian provinces.

There are 82,000 *chemists* and chemical engineers with college degrees in the United States and 23,000 other chemists without degrees.



To Win a Battle or Build a Better Mousetrap



Here is a range finder prism . . . the glass heart of one of the most precise optical instruments that the ingenuity of man has produced . . . so accurate that the angular error amounts to no more than 1 inch in 6½ miles. Created by Bausch & Lomb, every step in its manufacture has been controlled by the world's finest optical glass technicians. From the selection of the ingredients from which the optical glass is made to the final polishing, the objective has been to make America's gunfire the most accurate and deadly in the world.

This is the same care and these the same

skills that are also producing the fine optical instruments used in the furtherance of our war effort. Tomorrow, many of those instruments will be available to help build better lawnmowers . . . razor blades . . . automobiles . . . vacuum cleaners, etc. . . . to hasten progress in scientific research, medicine, education.

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New Transport Plane

The CW-20E, biggest and fastest twin-engine transport, will be adapted as a luxury passenger airliner for postwar use; includes many new comforts.

► THE BIGGEST and fastest twin-engine transport plane in the world was shown at Lambert Field by its manufacturers, the Curtiss-Wright Corporation. The new plane, known as the CW-20E, is the luxury airliner version of the military transport C-46, used widely by the Army and Navy to carry troops and supplies to world battlefronts during the past three years.

The new plane is designed to meet the needs of medium-range airline operations, and will be used by airlines for limited stop service between such points as New York and Miami, or Chicago and Denver. It is designed to take off from, and land on, the average-sized airport.

The passenger version of the plane includes many features suggested by airline operators, and others which are the result of experience gained from flying the military model over the world under a variety of weather conditions.

Many new comfort features include interchangeable chairs provided with finger-tip control for reclining the back and sliding the seat forward, flush-type

ash trays built into the arm of each chair, and a small ledge on the lower portion of each window frame for personal articles such as handbags, cigarettes, compacts, and cameras, overhead racks for luggage and packages run the full length of the cabin. A single, indirect fluorescent lighting fixture runs the entire length of the cabin ceiling. Individual reading lights are located in overhead panels above each chair, providing glareless illumination in a 20-inch circle of light at reading level.

The main ventilating system completely changes the air in the plane once every minute. The temperature inside the cabin is controlled so that it will remain at 70 degrees Fahrenheit, although the outside temperature may be as low as 40 degrees below zero.

The cabin is equipped with separate comfort rooms for men and women, as well as a complete kitchenette, for preparing and serving meals in the sky.

The CW-20E has more cargo space per passenger than any other transport airplane. In the two cargo holds, there

are 526 cubic feet of space for luggage, mail, and other shipments.

The pilot's vision is improved by the use of deep side-view windows made from double-pane safety glass and equipped with defogging nozzles for clear vision in cold flying weather.

Science News Letter, November 4, 1944

"Double-Bubble" Safety

► DOUBLE-BUBBLE construction of the low-wing 36-passenger Curtiss Commando CW-20E passenger and cargo plane assures greater comfort, safety and economy of operation than have previously been achieved in transport airplanes.

At a special press showing in St. Louis facts about this largest twin-engine transport were revealed. The double-bubble construction of the fuselage can best be visualized by thinking of the plane's cross section as two interlocking circles, the larger on top of the smaller, with a straight line which is the cabin floor across the point where they intersect. This patented design was originally intended to be used for a pressurized cabin for high-altitude flying. Although the cabin may be pressurized, the space in the smaller bubble, under the cabin floor, is now offered as a cargo hold for 526 cubic feet of baggage, boxes, and mail.

In a crash landing the bottom bubble provides added protection for passengers, since it acts as a cushion for the main cabin when it hits the ground. In over 100 crash landings there is no record of the bottom bubble being smashed or broken. Recently, near Jacksonville, Fla., one of these planes landed on its belly. After fitting on new propellers the plane took off again, having suffered no damage to the fuselage.

Facilities for handling cargo and servicing the plane are so arranged that the time needed on the ground at stops is considerably reduced. Cargo is rapidly loaded through special doors in the side of the bottom bubble. Electric batteries are mounted on an elevator under the fuselage, and may be lowered quickly for rapid replacement.

Power enough to lift a half-ton elevator at the speed of sound, or to drive more than 40 average automobiles, is contained in each of the two 2,200-horsepower engines that are used in the new passenger plane. These are the same Wright Cyclone air-cooled engines that thrust the B-29 Superfortresses and the giant Martin Mars flying boats through the air today.

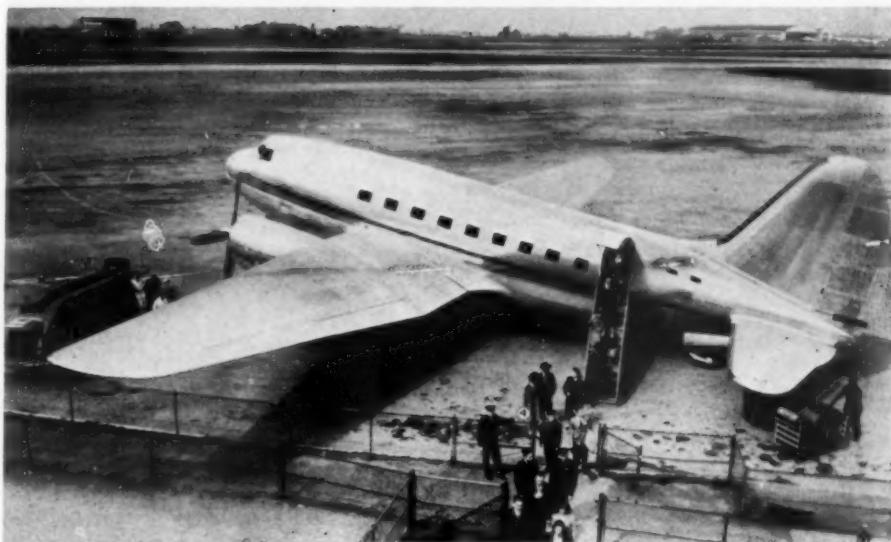
Science News Letter, November 4, 1944

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FASTEST TRANSPORT—The CW-20E Curtiss Commando will look like this and will have many innovations to assure greater comfort, safety, and economy of operation in the postwar future.

• Books of the Week •

AIRCRAFT SHEET METAL BLUEPRINT READING—Harry H. Coxen and others—*American Technical Society*, 132 p., paper, illus., \$2.50.

ARCHAEOLOGY OF NORTHWESTERN VENEZUELA—Alfred Kidder, II—*Peabody Museum of American Archaeology and Ethnology*, 178 p., paper, illus., \$3.75. (Papers of the Museum, vol. XXVI, No. 1.)

A DIPPER FULL OF STARS, A Beginner's Guide to the Heavens—Lou Williams—*Follett*, 170 p., illus., \$2.

BRAZIL ON THE MARCH—A Study in International Cooperation—Morris Llewellyn Cooke—*McGraw*, 303 p., illus., \$3.

CHEMICAL ENGINEERING PLANT DESIGN—Frank C. Vilbrandt—*McGraw*, 452 p., illus., \$5, 2nd ed.

DIRECT-CURRENT CIRCUITS—Earle M. Morecock—*Harper*, 387 p., illus., \$3.25.

FOREIGN INFLUENCES IN AMERICAN LIFE—David F. Bowers—*Princeton Univ. Press*, 254 p., illus., \$3.

FUNDAMENTALS OF CHEMISTRY AND THEIR APPLICATIONS IN MODERN LIFE—Monroe M. Offner—*Blakiston*, 408 p., illus., 69c.

AN INTRODUCTION TO PUBLIC HEALTH—Harry S. Mustard—*Macmillan*, 283 p., \$3.25, 2nd ed.

INVESTIGATIONS IN EROSION CONTROL AND RECLAMATION OF ERODED LAND AT THE CENTRAL PIEDMONT CONSERVATION EXPERIMENT STATION, STATESVILLE, N. C., 1930-40—T. L. Copley and others—*Gov. Print. Off.*, 66 p., paper, illus., 15c. (U. S. Dept. of Agric., Soil Conservation Service, Tech Bull., No. 873.)

LABORATORY MANUAL FOR GENERAL ZOOLOGY—Tracy I. Storer—*McGraw*, 150 p., illus., \$1.25.

THE MATHEMATICS OF PHYSICS AND CHEMISTRY—Henry Margenau and George

Moseley Murphy—*Van Nostrand*, 588 p., \$6.50.

NAVAHO WITCHCRAFT—Clyde Kluckhohn—*Peabody Museum of American Archaeology and Ethnology*, 149 p., paper. \$2.25. (Papers of the Museum, vol. XXII, No. 2.)

RADIO'S 100 MEN OF SCIENCE—Orrin E. Dunlap, Jr.—*Harper*, 294 p., illus., \$3.50.

THE SCHOLAR AND THE FUTURE OF THE RESEARCH LIBRARY—Fremont Rider—*Hadham Press*, 236 p., illus., \$4.

SMITHSONIAN PYRHELIOMETRY AND THE ANDEAN VOLCANIC ERUPTIONS OF APRIL 1932—L. B. Aldrich—*Smithsonian Institution*, 5 p., paper, 5c. (Smithsonian Misc. Collections, vol. 104, No. 6).

TABER'S DICTIONARY OF GYNECOLOGY AND OBSTETRICS—Clarence Wilbur Taber—*F. A. Davis Co.*, \$3.50.

TERNARY SYSTEMS—INTRODUCTION TO THE THEORY OF THREE COMPONENT SYSTEMS—G. Masing—*Reinhold*, 173 p., illus., \$4.50.

TRAVELERS ALL, The Story of How Plants Go Places—Irma E. Webber—*Scott, W. R.*, \$1.25. Basic facts in colorful fashion, for children.

WHAT SHIP IS THAT?—E. C. Talbot-Booth, ed.—*Didier Pubs*, illus., \$4.

Science News Letter, November 4, 1944

PUBLIC HEALTH

Deaths in Large Cities Show Big Increase

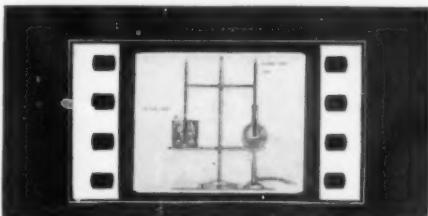
► DEATHS in 92 large cities of the United States increased from 8,347 the week of Oct. 14 to 8,982 the week ending Oct. 21, according to figures reported to the U. S. Census Bureau. Cause of

this large increase, which is also considerably above the three-year average of 8,371 deaths for this particular week, is not known, since only total figures are included in the weekly telegraphic reports from the cities. Reports of deaths by specific causes come in later.

A slight increase in infantile paralysis cases brought the total up to 711 for the week ending Oct. 21, the U. S. Public Health Service reports. Massachusetts and New York City and State had the chief increases. With the epidemic dying out so slowly and 16,855 cases reported so far this year, health authorities believe the total for the year will come close to 20,000.

The year 1944 is also expected to be a record year for cases of endemic typhus fever. Less serious than the European variety of typhus fever, the endemic type in this country is spread by rat fleas and is a considerable health problem in the South. Total number of cases this year have passed the 4,000 mark. Last year, with the largest number of cases reported for any previous year, there were 3,479.

Science News Letter, November 4, 1944



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• **WATER-TIGHT**, air-tight zippers are ordinary metal slide fasteners with uniquely overlapping rubber lips which create excellent seals against any pressure. The rubber lips are placed on either side of the fastener and held by stitching or cementing. They can be applied to metal, fabric or sheet rubber.

Science News Letter, November 4, 1944

• **SCARECROW** for gardens, to protect seeds and crops from birds and mammals, is a hawk-shaped device with a wooden body, glass eyes and wings and tail of turkey feathers. Suspended from a horizontal wire stretched over the garden, it soars like a hawk in either light or heavy wind.

Science News Letter, November 4, 1944

• **SHIP-RAISING** device, newly patented, consists of a pair of double-hinged giant grapples to fit over opposite sides of the boat. Water-filled pontoons are attached above the hinges of the grapple. Air forced into the pontoons replaces the water and their buoyancy locks the grapples to the sides of the boat, then raises it.

Science News Letter, November 4, 1944

• **TAPE PRINTER**, for making cellulose numeral tape used to identify the hundreds of units going into a giant airplane, consists of a keyed wooden take-up wheel, two feed spools to hold transparent and white cellulose tape re-



spectively, a printing roll, and various guides and inking rolls. The picture shows the simple, efficient machine.

Science News Letter, November 4, 1944

• **HEAT REFLECTIVE** material, made of a textile fabric woven from plastic fibers of cellulose acetate into which fine aluminum flakes have been incorporated, may line future clothing and bed coverings to prevent the loss of body heat. A material recently developed is flexible and permits the passage of air.

Science News Letter, November 4, 1944

• **FOUNTAIN** shaving brush has a container for a soap and water mixture at its top with mechanical means of forcing a little of the mixture through the lower section, where it is electrically heated, and out into the brush itself. The bristles surround a cupshaped end adapted to massage the face and rub the lather in.

Science News Letter, November 4, 1944

• **COASTING SLED** for winter fun has runners of the conventional ski design with hand grips at their forward ends. These runners are attached to the uprights holding the body platform with hinged joints so that either may be raised over an obstacle without disturbing the other.

Science News Letter, November 4, 1944

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, 1719 N St. N. W., Washington 6, D. C., and ask for Gadget Bulletin 232.

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